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Editorial

The veteran and the rookie

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This editorial refers to 'Mortality rates in patients with ST-elevation vs. non-ST-elevation acute myocardial infarction: observations from an unselected cohort'† by C.J. Terkelsen *et al.*, on page 18

Clinical registries have systematically shown that routine clinical practice deals with sicker patients and faces higher morbidity and mortality than the artificial environment of strictly defined randomized-controlled trials might otherwise suggest.[1–3] The series of Terkelsen *et al.*,[4] in the present issue of the *European Heart Journal*, focuses on a cohort of 654 patients, representing all patients admitted to hospital for acute myocardial infarction (AMI) from a catchments area of 139 000 inhabitants in Denmark. Their data are of particular interest because (i) they constitute an attempt to describe 'real life' in a comprehensive manner by targeting and checking all hospital admissions, rather than relying on voluntary reports from selected participating centres;[1–3] and (ii) because angiographic and survival status were obtained up to 1 year. Their analysis confirms the persistent high, in-hospital mortality of AMI in the general population (14%), and also reveals three main surprising facts: the median age of admitted patients was advanced (73 years), the incidence of non-ST-elevation myocardial infarction (NSTEMI) was high (54% of all those diagnosed as AMI) and the prognosis of NSTEMI (31% 1 year mortality) was worse than that of STEMI (21% 1 year mortality).

The median age is clearly an important parameter to keep in mind when assessing the significance of a 14% early mortality. In AMIS, GRACE and the EHS,[1–3] the mean age was under 70 in all three registries, and hospital mortality varied between 2.4 and 11.8% depending on the subgroups considered. Older patients are often excluded from randomized-controlled trials, and they may also be more likely not to be entered into open registries because of late arrival at hospital, death in the emergency room or failure to be admitted to either the ICU or the catheterization laboratory. The present series reminds us that the elderly constitute a large—and growing—subset of patients admitted to hospital for AMI. Some of the other multivariate predictors of hospital mortality also correspond to typical exclusion criteria used in randomized trials: excessive delay in reaching the hospital and azotaemia are good examples. Thus, for registry data to be adequately assessed, investigators need to remember that acquisition of sufficient information concerning essential cardiac and non-cardiac parameters is of major importance: the very factors that exclude patients from randomized trials are often those with the greatest impact on clinical outcome. Both acute management and discharge treatment reported in the series by Terkelsen *et al.*[4] are probably a good reflection of the average European approach. Only 48% of patients with NSTEMI benefited from an early invasive strategy, however, and only 35–51% of patients were discharged with lipid-lowering therapy. Both of these can be seen as less than optimal in view of current knowledge and may have also contributed to the high observed mortality.

STEMI vs. NSTEMI

ST-segment elevation on the ECG is usually ascribed to a transmural current of injury leading to an outward-directed ST vector, whereas ST depression is more often associated with subendocardial ischaemia and an inward-directed vector.[5] However, both the specificity and the sensitivity of these changes can be profoundly altered by several factors such as prior myocardial infarction or bypass surgery, location of the ischaemic territory, variations in coronary anatomy, pre-existing bundle branch block, etc.[6] Because of the amount of myocardium involved, one would logically expect transmural ischaemia to be associated with a more unfavourable prognosis, but the very opposite was

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shown in the study by Terkelsen *et al.*,[4] where the unadjusted 1 year mortality was 30.5% for NSTEMI and 20.5% for STEMI. Even more significant, was the fact that NSTEMI (vs. STEMI) remained an independent predictor of 1 year mortality in a multivariate analysis, together with advanced age, renal failure, prior heart failure, depressed left ventricular ejection fraction, and prolonged pre-hospital delay. Other registries have differed: in the Euro Heart Survey[2] early in-hospital mortality was 7% for STEMI and only 2.8% for NSTEMI, and in GRACE[3] the figures were 7% for STEMI and 6% for NSTEMI, respectively. Clearly, a diagnosis of NSTEMI covers a very broad spectrum of coronary diseases ranging from minimal myocardial damage with single vessel disease in relatively young and otherwise healthy patients, to more important acute myocardial damage associated with diffuse coronary atherosclerosis and extensive pre-existing myocardial dysfunction. Depending on the patient mix that is being considered, both acute and longer-term outcomes are bound to be very different.

Acute haemodynamic status

The major missing cardiovascular parameter in the series by Terkelsen *et al.*[4] is the clinical haemodynamic status at admission. The Killip scoring system has been available to clinicians for over 35 years[7] and has repeatedly been shown to be an extremely powerful predictor of short-term mortality.[8] It is therefore possible that the list of multivariate predictors in the Danish series might have been different if this information had been collected at admission by the investigators. For patients with STEMI in the AMIS registry,[1] the likelihood of dying in hospital was six times higher when shock (Killip IV) was present at admission, and 3.6 times higher when pulmonary oedema (Killip III) was diagnosed. In the SHOCK trial registry,[8] 152 patients with AMI and early cardiogenic shock had no ST-segment elevation on the presenting ECG; they represented 17% of the 881 patients included in the registry and were older, with more prior AMI, heart failure, renal failure, bypass surgery and peripheral vascular disease than the patients with STEMI. They also had lower peak creatinine kinase (CK) values, more frequently suffered from triple vessel disease, and the left circumflex artery was more often the culprit vessel for the acute event. In-hospital mortality for NSTEMI patients was 62.5%, nearly identical to the 60.4% observed for patients with STEMI. The clinical profile of the two groups of patients in the SHOCK registry is thus quite similar to those observed by Terkelsen *et al.*,[4] and a pattern, probably best applicable to registries, can be seen to emerge: younger patients with less prior cardiac and non-cardiac events in their medical history ('the rookie hearts') tend more frequently to present with transmural ischaemia when they are admitted for AMI and have more acute myocardial damage as shown by higher peak CK values; conversely, older patients who more frequently have suffered prior damage to their left ventricle, and also have more non-cardiac morbidity ('the veteran hearts'), tend to have less acute myocardial damage and no ST-segment elevation, but a similar or worse prognosis, both acutely and after follow-up at 1 year.

The practical conclusions are obvious: the vast majority of patients with NSTEMI who are appropriate candidates should be treated aggressively and early in their clinical course, since their prognosis is probably similar to, or worse than, those with STEMI. This usually means rapid referral for invasive investigation in view of timely coronary revascularization.[9] On average, there may be less myocardium at stake for the 'veterans' than for the 'rookies', but not necessarily less clinical benefit.

References

1. Urban P, Bernstein MS, Costanza MC *et al.* for the AMIS Investigators. An Internet-based registry of acute myocardial infarction in Switzerland. *Kardiovasc Med* 2000;**3**:430–440.
2. Hasdai D, Behar S, Wallentin L *et al.* A prospective survey of the characteristics, treatments and outcomes of patients with acute coronary syndromes in Europe and the Mediterranean basin. *Eur Heart J* 2002;**23**:1190–1201.
3. Fox KAA, Goodman SG, Klein W *et al.* Management of acute coronary syndromes. Variations in practice and outcome. Findings from the Global Registry of Acute Coronary Events (GRACE). *Eur Heart J* 2002;**23**:1177–1189.
4. Terkelsen CJ, Lassen JF, Nørgaard BL *et al.* mortality rates in patients with ST-elevation versus non-ST-elevation acute myocardial infarction. *Eur Heart J* 2005;**26**:18–26. First published on November 23 2004, doi:10.1093/eurheartj/ehi002.
5. Mirvis DM, Goldberger AL. Electrocardiography. In: Braunwald E, Zipes DP, Libby P, eds. *Heart Disease*. 6th ed. Philadelphia: WB Saunders; 2001. p82–128.
6. Zimetbaum PJ, Josephson ME. Use of the electrocardiogram in acute myocardial infarction. *New Engl J Med* 2003;**348**:933–940.
7. Killip T, Kimball JT. Treatment of myocardial infarction in a coronary care unit. A two-year experience with 250 patients. *Am J Cardiol* 1967;**20**:457–464.
8. Jacobs AK, French JK, Col J *et al*, for the SHOCK Investigators. Cardiogenic shock with non-ST segment elevation myocardial infarction: a report from the SHOCK trial registry. *J Am Coll Cardiol* 2000;**36**:1091–1096.
9. Bavry AA, Kumbhani DJ, Quiroz R *et al.* Invasive therapy along with glycoprotein IIb/IIIa inhibitors and intracoronary stents improves survival in non-ST-segment elevation acute coronary syndromes: a meta-analysis and review of the literature. *Am J Cardiol* 2004; **93**:830–835.